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# Barrel Formulas

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# List of 11 Barrel Formulas

## Barrel

### Height of Barrel

#### 1) Height of Barrel

Open Calculator

fx $$h = \sqrt{d_{Space}^2 - \left(4 \cdot r_{Top/Bottom}^2\right)}$$

ex $$12.49\text{m} = \sqrt{(16\text{m})^2 - \left(4 \cdot (5\text{m})^2\right)}$$

#### 2) Height of Barrel given Volume

Open Calculator

fx $$h = \frac{3 \cdot V}{\pi \cdot \left(\left(2 \cdot r_{Middle}^2\right) + r_{Top/Bottom}^2\right)}$$

ex $$12.01089\text{m} = \frac{3 \cdot 2830\text{m}^3}{\pi \cdot \left(\left(2 \cdot (10\text{m})^2\right) + (5\text{m})^2\right)}$$

# Radius of Barrel

## 3) Radius at Middle of Barrel

Open Calculator

fx $$r_{Middle} = \sqrt{\frac{\frac{3 \cdot V}{\pi \cdot h} - r_{Top/Bottom}^2}{2}}$$

ex $$10.0051\text{m} = \sqrt{\frac{\frac{3 \cdot 2830\text{m}^3}{\pi \cdot 12\text{m}} - (5\text{m})^2}{2}}$$

## 4) Radius at Top and Bottom of Barrel

Open Calculator

fx $$r_{Top/Bottom} = \sqrt{\frac{3 \cdot V}{\pi \cdot h} - \left(2 \cdot r_{Middle}^2\right)}$$

ex $$5.020383\text{m} = \sqrt{\frac{3 \cdot 2830\text{m}^3}{\pi \cdot 12\text{m}} - \left(2 \cdot (10\text{m})^2\right)}$$

## 5) Radius at Top and Bottom of Barrel given Space Diagonal and Height

Open Calculator

fx $$r_{Top/Bottom} = \sqrt{\frac{d_{Space}^2 - h^2}{4}}$$

ex $$5.291503\text{m} = \sqrt{\frac{(16\text{m})^2 - (12\text{m})^2}{4}}$$

# Space Diagonal of Barrel

## 6) Space Diagonal of Barrel

Open Calculator

fx $$d_{Space} = \sqrt{h^2 + \left(4 \cdot r_{Top/Bottom}^2\right)}$$

ex $$15.6205\text{m} = \sqrt{(12\text{m})^2 + \left(4 \cdot (5\text{m})^2\right)}$$

## 7) Space Diagonal of Barrel given Height

Open Calculator

fx $$d_{Space} = \sqrt{h^2 + \left(4 \cdot \left(\frac{3 \cdot V}{\pi \cdot h} - \left(2 \cdot r_{Middle}^2\right)\right)\right)}$$

ex $$15.64663\text{m} = \sqrt{(12\text{m})^2 + \left(4 \cdot \left(\frac{3 \cdot 2830\text{m}^3}{\pi \cdot 12\text{m}} - \left(2 \cdot (10\text{m})^2\right)\right)\right)}$$

## 8) Space Diagonal of Barrel given Volume

fx

Open Calculator

$$d_{Space} = \sqrt{\left(\frac{3 \cdot V}{\pi \cdot \left(\left(2 \cdot r_{Middle}^2\right) + r_{Top/Bottom}^2\right)}\right)^2 + \left(4 \cdot r_{Top/Bottom}^2\right)}$$

ex $$15.62887\text{m} = \sqrt{\left(\frac{3 \cdot 2830\text{m}^3}{\pi \cdot \left(\left(2 \cdot (10\text{m})^2\right) + (5\text{m})^2\right)}\right)^2 + \left(4 \cdot (5\text{m})^2\right)}$$

# Volume of Barrel

## 9) Volume of Barrel

Open Calculator

fx $$V = \frac{\pi \cdot h}{3} \cdot \left( \left( 2 \cdot r_{Middle}^2 \right) + r_{Top/Bottom}^2 \right)$$

ex $$2827.433\text{m}^3 = \frac{\pi \cdot 12\text{m}}{3} \cdot \left( \left( 2 \cdot (10\text{m})^2 \right) + (5\text{m})^2 \right)$$

## 10) Volume of Barrel given Height

Open Calculator

fx $$V = \frac{\pi \cdot h}{3} \cdot \left( \left( 2 \cdot r_{Middle}^2 \right) + \frac{d_{Space}^2 - h^2}{4} \right)$$

ex $$2865.133\text{m}^3 = \frac{\pi \cdot 12\text{m}}{3} \cdot \left( \left( 2 \cdot (10\text{m})^2 \right) + \frac{(16\text{m})^2 - (12\text{m})^2}{4} \right)$$

## 11) Volume of Barrel given Space Diagonal and both Radius

Open Calculator

fx $$V = \frac{\pi \cdot \sqrt{d_{Space}^2 - \left( 4 \cdot r_{Top/Bottom}^2 \right)}}{3} \cdot \left( \left( 2 \cdot r_{Middle}^2 \right) + r_{Top/Bottom}^2 \right)$$

ex $$2942.886\text{m}^3 = \frac{\pi \cdot \sqrt{(16\text{m})^2 - \left( 4 \cdot (5\text{m})^2 \right)}}{3} \cdot \left( \left( 2 \cdot (10\text{m})^2 \right) + (5\text{m})^2 \right)$$

## Variables Used

- $d_{Space}$ Space Diagonal of Barrel *(Meter)*
- $h$ Height of Barrel *(Meter)*
- $r_{Middle}$ Radius at Middle of Barrel *(Meter)*
- $r_{Top/Bottom}$ Radius at Top and Bottom of Barrel *(Meter)*
- $V$ Volume of Barrel *(Cubic Meter)*

## Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  *Archimedes' constant*
- Function: **sqrt**, sqrt(Number)
  *A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.*
- Measurement: **Length** in Meter (m)
  *Length Unit Conversion*
- Measurement: **Volume** in Cubic Meter ($m^3$)
  *Volume Unit Conversion*

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